FOURTH GRADE MATHEMATICS

GRADE LEVEL CONTENT EXPECTATIONS

4 MATH

v.6.04

NUMBER & OPERATIONS

ALGEBRA

MEASUREMENT

GEOMETRY

DATA & PROBABILITY

Welcome to a preview of Michigan's mathematical future! This document not only introduces Michigan's new Grade Level Content Expectations for mathematics, it also establishes high expectations in mathematics to better prepare all K-12 Michigan students for the challenges of the future.

Creating grade-level expectations involves a complex combination of understanding of mathematics, curriculum, student learning, teaching, current practices, and policy. Curriculum directors, mathematics educators, and classroom teachers from Michigan school districts across the state, together with mathematics and mathematics education faculty from universities across the state, have been involved in the development and/or review of the **Michigan Mathematics Grade Level Content Expectations.** The GLCE are intended to be usable as a framework for the development of grade-by-grade assessments, and to provide teachers with a guide for their instructional and curricular emphases in classrooms. The expectations were constructed to feature continuity from one grade to the next, and to ensure coherence both mathematically and pedagogically. These expectations represent a challenge toward which to aspire; in some cases, teachers and mathematics educators will be called on to move beyond their current practice and experience into territory that will be both demanding and rewarding. Michigan students can rise to the challenge of high academic standards. This document provides a set of ambitious goals for all of us.

This document is intended to be an assessment tool. This means students will be expected to be proficient in the concepts and skills included in this document at the end of the indicated grade level. These expectations are written to convey intended performances by students. The expectations here generally represent key landmarks in mathematics learning — areas where students are expected to have consolidated their understandings and skills. Thus it does not attempt to elaborate all of the precursor ideas and concepts that lead to a particular expectation in a particular grade level — it instead assumes that teachers will build up to the expectations through exploration and development of concepts and processes

The Grade Level Content Expectations are not designed to be a curriculum document, or to function as a scope and sequence framework. It is not designed to suggest the various pedagogical options and strategies that might best enable students to attain these expectations. Rather, it should serve as a basis for the development of a curriculum and instructional strategies that would help the students attain the concepts and skills necessary to meet the GLCE. Various groups are being organized

(continued on next page)

MICHIGAN Department of Education
Office of School Improvement

www.michigan.gov/mde

to develop clarification documents, content examples, more elaborated explanations, and suggestions for professional development that would support these expectations. Ultimately, teachers, school personnel and district leaders will need to collaborate and draw on their own professional wisdom and experience, as well as on research, to decide how best to organize instruction to help their students meet these expectations.

The mathematics content expectations have been organized into five strands: Number and Operations, Algebra, Geometry, Measurement, and Data and Probability.

These expectations are being presented in two formats; one designed to show specific grade level expectations and a second to show how the expectations transition from one grade level to the next. In the **grade level** format the expectations are organized first by the five strands. Each of the strands is then broken down into content pieces titled "Topics" in an attempt to cluster related ideas for teaching continuity. Under each "Topic" are listed the expectations.

The second format is a "**cross-grade**" version, which has been designed with the intent that one grade level can be easily compared with another and to highlight the mathematical growth that is envisioned across the grades. This format also has been organized into the five strands. However, each strand has been subdivided into broader, more conceptual groupings called "Domains," to allow for cross grade comparison of the expectations. In several of the strands, the "domains" are similar to the "standards" in *Principles and Standards for School Mathematics* from the National Council of Teachers of Mathematics. In the "cross-grade" version, some key expectations are "cross-listed" in grey when they seem especially crucial to the development of another strand. For instance, several strands from the Number and Operations strand are also listed in grey in the Algebra strand.

Although this organization does not include what have typically been called "process" strands, the importance of mathematical process in the development of these proficiencies cannot be underestimated. Embedded within these expectations are emphases on representation, problem solving, and reasoning as appropriate. The importance of making mathematical connections is conveyed through the cross listing. Finally, the process of communication is foundational to all of mathematics learning.

With the cooperation of all those involved in the education of Michigan students, we can enable our young people to attain the highest standards – and thereby open doors for them to have fulfilling and successful lives in a quantitatively and technologically complex future.

FOURTH GRADE

By the end of fourth grade students will have consolidated addition and subtraction of whole numbers, and will have done much in multiplication and division of whole numbers. Work in number also extends to fractions and decimal fractions, using limited sets of fractions as the basis for building meaning for equivalent fractions, addition, subtraction, and fraction as part of a set of objects. Work in measurement becomes more sophisticated with emphasis on units and conversion within systems of units. In order to allow for the development of Number and Operations, there are relatively few expectations in Geometry and Data and Probability in Grade 4.

NUMBER AND OPERATIONS

Understand and use number notation and place value

N.ME.04.01 Read and write numbers to 1,000,000; relate them to the quantities they represent; compare and order.

N.ME.04.02 Compose and decompose numbers using place value to 1,000,000's, e.g., 25,068 is 2 ten thousands, 5 thousands, 0 hundreds, 6 tens, and 8 ones.

N.ME.04.03 Understand the magnitude of numbers up to 1,000,000; recognize the place values of numbers, and the relationship of each place value to the place to its right, e.g., 1,000 is 10 hundreds.

Use factors and multiples

N.ME.04.04 Find all factors of a whole number up to 50, and list factor pairs.

N.ME.04.05 List the first ten multiples of a given one-digit whole number; determine if a whole number is a multiple of a given one-digit whole number and if a one-digit number is a factor of a given whole number.

N.MR.04.06 Know that some numbers including 2, 3, 5, 7, and 11 have exactly two factors (1 and the number itself) and are called prime numbers.

N.MR.04.07 Solve problems about factors and multiples, e.g., since $100 = 4 \times 25$, and $200 = 2 \times 100$, then $200 = 2 \times 4 \times 25 = 8 \times 25$.

Add and subtract whole numbers

N.FL.04.08 Add and subtract whole numbers fluently.

Multiply and divide whole numbers

N.ME.04.09 Multiply two-digit numbers by 2, 3, 4, and 5, using the distributive property, e.g., $21 \times 3 = (1 + 20) \times 3 = (1 \times 3) + (20 \times 3) = 3 + 60 = 63$

N.FL.04.10 Multiply fluently any whole number by a one-digit number, and a three-digit number by a two-digit number; for a two-digit by one-digit multiplication, use distributive property to develop meaning for the algorithm.

N.FL.04.11 Divide numbers up to four digits by one-digit numbers and by 10.

N.FL.04.12 Find unknowns in equations such as $a \div 10 = 25$; $125 \div b = 25$.

N.MR.04.13 Use the relationship between multiplication and division to simplify computations and check results, e.g., $6840 \div 20 = (6840 \div 10) \div 2 = 684 \div 2 = 342$.

N.FL.04.14 Solve applied problems involving whole number multiplication and division.

Read, interpret and compare decimal fractions

N.ME.04.15 Read and interpret decimals up to two decimal places; relate to money and place value decomposition.

N.ME.04.16 Know that terminating decimals represents fractions whose denominators are 10, 10×10, $10 \times 10 \times 10$, etc., e.g., powers of 10.

N.ME.04.17 Locate tenths and hundredths on a number line.

N.ME.04.18 Read, write, interpret, and compare decimals up to two decimal places.

N.MR.04.19 Write tenths and hundredths in decimal and fraction forms, and know the decimal equivalents for halves and fourths.

Understand fractions

N.ME.04.20 Understand fractions as parts of a set of objects.

N.MR.04.21 Explain why equivalent fractions are equal, using models such as fraction strips or the number line, for fractions with denominators of 12 or less, or equal to 100.

N.MR.04.22 Locate and compare fractions on the number line, including improper fractions and mixed numbers with denominators of 12 or less.

N.MR.04.23 Understand the relationships among halves, fourths and eighths and among thirds, sixths and twelfths.

N.MR.04.24 Know that fractions of the form where $\frac{m}{n}$, is greater than n, are greater than 1 and are called improper fractions; locate improper fractions on the number line; express as mixed numbers.

N.MR.04.25 Write improper fractions as mixed numbers, and understand that a mixed number represents the number of "wholes" and the part of a whole remaining, e.g., $\frac{5}{4} = 1 + \frac{1}{4} = 1\frac{1}{4}$.

N.MR.04.26 Compare and order up to three fractions with denominators 2, 4, and 8, and 3, 6, and 12, including improper fractions and mixed numbers.

Add and subtract fractions

N.MR.04.27 Add and subtract fractions less than 1 with denominators 12 or less and including 100, in cases where the denominators are equal or when one denominator is a multiple of the other, e.g., 1/12 + 5/12= 6/12; 1/6 + 5/12 = 7/12; 3/10 - 23/100 = 7/100.

N.FL.04.28 Solve fraction problems involving sums and differences for fractions where one denominator is a multiple of the other (denominators 2 through 12, and 100).

N.MR.04.29 Solve for the unknown in equations such as: $\frac{1}{8} + x = \frac{5}{8}$ or $\frac{3}{4} - y = \frac{1}{2}$.

Multiply fractions by whole numbers

N.MR.04.30 Multiply fractions by whole numbers, using repeated addition and area or array models.

Add and subtract decimal fractions

N.MR.04.31 Use mathematical statements to represent problems that use addition and subtraction of decimals with up to two-digits; solve.

N.FL.04.32 Add and subtract decimals up to two decimal places.

Multiply and divide decimal fractions

N.FL.04.33 Multiply and divide decimals up to two decimal places by a one-digit whole number where the result is a terminating decimal, e.g., 0.42 ÷ 3 = 0.14, but not 5 ÷ 3 = $1.\overline{6}$

Estimate

N.FL.04.34 Estimate the answers to calculations involving addition, subtraction, or multiplication.

N.FL.04.35 Know when approximation is appropriate and use it to check the reasonableness of answers; be familiar with common place-value errors in calculations.

N.FL.04.36 Make appropriate estimations and calculations fluently with whole numbers using mental math strategies.

Problem-solving

N.MR.04.37 Solve applied problems using the four basic arithmetic operations for appropriate fractions, decimals, and whole numbers.

MEASUREMENT

Measure using common tools and appropriate units

M.UN.04.01 Measure using common tools and select appropriate units of measure.

M.PS.04.02 Give answers to a reasonable degree of precision in the context of a given problem.

M.UN.04.03 Measure and compare integer temperatures in degrees.

M.TE.04.04 Measure surface area of cubes and rectangular prisms by covering and counting area of the faces.

Convert measurement units

M.TE.04.05 Carry out the following conversions from one unit of measure to a larger or smaller unit of measure: meters to centimeters, kilograms to grams, liters to milliliters, hours to minutes, minutes to seconds, years to months, weeks to days, feet to inches, ounces to pounds (using numbers that involve only simple calculations).

Use perimeter and area formulas

M.TE.04.06 Know and understand the formulas for perimeter and area of a square and a rectangle; calculate the perimeters and areas of these shapes and combinations of these shapes using the formulas.

M.TE.04.07 Find one dimension of a rectangle given the other dimension and its perimeter or area.

M.TE.04.08 Find the side of a square given its perimeter or area.

M.PS.04.09 Solve contextual problems about perimeter and area of squares and rectangles in compound shapes.

Understand right angles

M.TE.04.10 Identify right angles and compare angles to right angles.

Problem-solving

M.PS.04.11 Solve contextual problems about surface area.

GEOMETRY

Understand perpendicular, parallel, and intersecting lines

G.GS.04.01 Identify and draw perpendicular, parallel, and intersecting lines using a ruler and a tool or object with a square (90°) corner.

Identify basic geometric shapes and their components, and solve problems

G.GS.04.02 Identify basic geometric shapes including isosceles, equilateral and right triangles, and use their properties to solve problems.

G.SR.04.03 Identify and count the faces, edges, and vertices of basic three-dimensional geometric solids including cubes, rectangular prisms, and pyramids; describe the shape of their faces.

GEOMETRY

Recognize symmetry and transformations

G.TR.04.04 Recognize plane figures that have line symmetry.

G.TR.04.05 Recognize rigid motion transformations (flips, slides, turns) of a two-dimensional object.

DATA AND PROBABILITY

Represent and solve problems for given data

D.RE.04.01 Construct tables and bar graphs from given data.

D.RE.04.02 Order a given set of data, find the median, and specify the range of values.

D.RE.04.03 Solve problems using data presented in tables and bar graphs, e.g., compare data represented in two bar graphs and read bar graphs showing two data sets.